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GUN WEAPON SYSTEM REPLACEMENT PROGRAM COORDINATION EFFORT STUDY--ETC(U)

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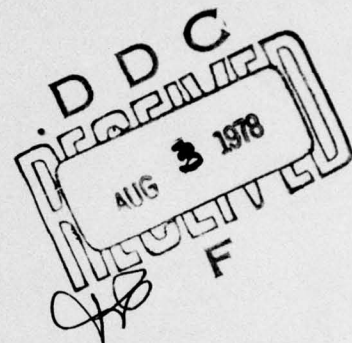


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GUN WEAPON SYSTEM REPLACEMENT PROGRAM COORDINATION EFFORT STUDY

June 1978



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Prepared for
DIRECTOR, GUN SYSTEM ENGINEERING DIVISION
NAVAL ORDNANCE STATION
INDIAN HEAD, MARYLAND
UNDER CONTRACT N00174-78-C-0105

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GUN WEAPON SYSTEM REPLACEMENT PROGRAM
COORDINATION EFFORT STUDY

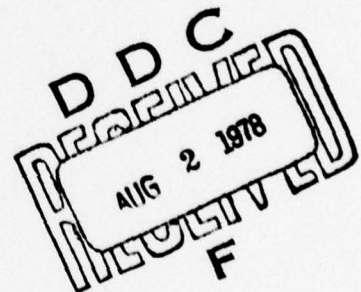
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Prepared for
Director, Gun System Engineering Division
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Indian Head, Maryland
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by
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ABSTRACT

The Gun Weapon System Replacement Program (GWSRP) plans the replacement of ordnance installed on active Fleet ships and Naval Reserve Force ships with overhauled and properly configured systems or components. The development of new maintenance programs, such as the Destroyer Engineered Operating Cycle (DDEOC) Program, has generated a variety of maintenance requirements and procedures affecting GWSRP systems. The GWSRP benefits from related maintenance programs, such as the DDEOC Program, and vice versa. It is important that these benefits be optimized by coordination of effort toward a common goal. Guidelines for the development of such coordination between the GWSRP and DDEOC Program are presented in this document. It is designed to assist the GWSRP and DDEOC Program Managers in their efforts to maximize the benefits accruing to their programs through the integration of their respective maintenance management activities.

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SUMMARY

This report presents the results of a study performed under Contract N00174-78-C-0105 for the Gun System Engineering Division, Naval Ordnance Station, Indian Head. The study was directed towards coordinating certain aspects of the work of the Gun Weapon System Replacement Program (GWSRP) and the Destroyer Engineered Operating Cycle (DDEOC) Program. The GWSRP plans the replacement of ordnance installed on active Fleet ships (O&MN funded) and Naval Reserve Force ships (O&MNR funded) with overhauled and properly configured systems or components. The Destroyer Engineered Operating Cycle (DDEOC) Program is designed to improve the material condition of selected cruiser, destroyer, and frigate class ships.

Information for the study was obtained from documents and personnel of the two programs. An additional source of information was the semi-annual GWSRP Planning Meeting, which was attended by ARINC Research personnel.

The information collected was analyzed to identify areas of mutual interest to both programs where integration of effort was feasible. Plans for implementing such integration were developed.

The study identified eight areas of gun weapon systems support in which the coordination of the GWSRP with the DDEOC Program would be likely to enhance the maintenance management support of gun weapon systems. They are:

- Inspection procedures
- Bid specifications written for overhauls
- Baseline overhaul (BOH) requirements
- Rotable pool requirements
- Management Information Systems data exchange
- Material Condition Assessment Procedures Conducted by DDEOC site teams
- Class Maintenance Plan requirements
- Program scheduling requirements

These areas of mutual interest should be the subjects of further engineering analyses to determine recommended integration action. The recommended action should provide for the enhanced management of the men, money, and material required to support gun weapon systems within the framework of the DDEOC Program.

GLOSSARY

ADP	Automatic Data Processing
ALT	Alteration
BOH	Baseline Overhaul
CMP	Class Maintenance Plan
CNO	Chief of Naval Operations
COMNAVSEASYSKOM	Commander, Naval Sea Systems Command
CRUDES	Cruisers/Destroyers
CSMP	Current Ship's Maintenance Project
CSRR	Combat Systems Readiness Review
CSRT	Combat Systems Readiness Test
CY	Calendar Year
D ALT	Alteration authorized and funded by the TYCOM
DD	Destroyer
DDEOC	Destroyer Engineered Operating Cycle
ECR	Equipment Condition Report
EOC	Engineered Operating Cycle
F ALT	Alteration funded by TYCOM and accomplished by Forces Afloat
FAR	Functions, Assignments, and Responsibilities
FF	Frigate
FMP	Fleet Modernization Program
FMSO	Fleet Material Support Office
FROGS	Fleet Report of Gun Systems
FY	Fiscal Year
GFE	Government Furnished Equipment
GFM	Government Furnished Material
GWSRP	Gun Weapon System Replacement Program
HM&E	Hull/Machinery/Electrical
ILS	Integrated Logistic Support
IMA	Intermediate Maintenance Activity
IMMP	Integrated Maintenance and Modernization Planning
K ALT	An alteration authorized and funded by NAVSEA
MCA	Material Condition Assessment
MCR	Material Condition Review
MDS	Maintenance Data System

GLOSSARY (continued)

MIS	Management Information System
MK	Mark
MOD	Modification
NAVORDSTA	Naval Ordnance Station
NAVSEA	Naval Sea Systems Command
NAVSEACEN	Naval Sea Support Center
NAVSUPSYSCOM	Naval Supply Systems Command
NOS/L	Naval Ordnance Station Louisville
O&MN	Operations and Maintenance, Navy (Appropriation)
O&MNR	Operations and Maintenance, Naval Reserve (Appropriation)
OPNAV	Office of the Chief of Naval Operations
OrdAlt	Ordnance Alteration
ORI	Ordnance Replacement Index
OVHL (or O/H)	Overhaul
PC&H	Packing, Crating and Handling
PERA	Planning and Engineering for Repairs and Alterations: (ASC) -Amphibious Ships and Craft, Norfolk NSYD (CRUDES)-Cruisers/Destroyers, Philadelphia NSYD (CSS) -Combat Support Ships, NAVSEA Industrial Support Office (NISO) San Francisco (CV) -Aircraft Carriers, etc., Puget Sound NSYD (SS) -Submarines, Portsmouth NSYD
PMS	Planned Maintenance System
POM	Program Objectives Memorandum
POT&I	Pre-Overhaul Test and Inspection
RAV	Restricted Availability
RMMS	Repair Maintenance Management System
ROH	Regular Overhaul
SARP	Ship Alteration and Repair Package
SFOMS	Ship's Force Overhaul Management System
ShipAlt	Ship Alteration
SPCC	Ships Parts Control Center
SRA	Selected Restricted Availability
SSIP	Ship Support Improvement Project
SUPSHIP	Supervisor of Shipbuilding, Conversion, and Repair

GLOSSARY (continued)

SURFLANT	Surface Force Atlantic
SURFPAC	Surface Force Pacific
TAV	Technical Availability
TRS	Technical Repair Standard
TYCOM	Type Commander
WDC	Work Definition Conference
3-M	Maintenance and Material Management

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CHAPTER ONE

INTRODUCTION

1.1 OBJECTIVE

The objective of this analysis is to identify existing and potential areas of interest between the Gun Weapon System Replacement Program and the Destroyer Engineered Operating Cycle Program implementation and make recommendations for integrating these interests.

1.2 BACKGROUND

The Gun Weapon System Replacement Program (GWSRP) was originated in 1964 by the Bureau of Naval Weapons as the Ordnance Replacement Program. The mission of the program was to provide a source of replacement for guns, fire control, and related equipment, most of which had been installed in the mid to late 1940s and had reached a state of disrepair through extended service. Under the program, available gun mounts, computers, radars, and related equipment were overhauled in a depot assembly line operation and used to replace badly worn guns and related systems installed in the Fleet. Removed items were placed in a repair pipeline to keep the replacement cycle going.

Intensified use of gun mounts in the Southeast Asia conflict and a drastic reduction in rotatable pool assets have increased the maintenance requirements of the gun weapon systems and highlighted the need for an efficient GWSRP. To keep abreast of the increasing volume and complexity of maintenance in an era of tightening defense budgets, the GWSRP planning process requires considerable coordination. A logical extension is to coordinate and integrate the activities of this established maintenance program with similar activities of the Destroyer Engineered Operating Cycle (DDEOC) Program.

In 1973, the Chief of Naval Operations (CNO) tasked the Commander, Naval Sea Systems Command (COMNAVSEASYS COM) to (1) investigate the feasibility of adopting extended overhaul cycles for destroyer-type ships, (2) investigate the feasibility of adapting a submarine-type Integrated Maintenance and Modernization Planning (IMMP) Program to destroyer-type ships, and (3) compare the projected annual costs of these maintenance policies with current annual costs of maintenance for the same types of ships.

On the basis of the resulting study, NAVSEA concluded that (1) extending the overhaul cycles for certain classes of destroyer-type ships was feasible, (2) some economy in total cycle maintenance costs could be anticipated as a result, and (3) additional management resources would be required to develop and manage the long-range maintenance management plan made necessary by the overhaul-cycle extension. That long-range plan would serve as a guide for scheduling and controlling major maintenance work and provide the capability for continuous review and evaluation of the material condition of the ships under the program.

Based on these conclusions and subsequent tasking by the CNO, the Destroyer Engineered Operating Cycle (DDEOC) Program was undertaken in August 1974 to develop a detailed maintenance strategy and implementation plan to support a 54 ± 6 months operating cycle for the FF-1052, DDG-37, and CG-16/26 Classes of ships. As this and other maintenance-related programs concurrently evolved, CNO Project Red "E", now the Ship Support Improvement Project (SSIP), was created in January 1975 to draw together, coordinate, and integrate all maintenance-related programs for surface ships.

Part of the SSIP effort is to explore and exploit the substantial benefits from the use of established products, procedures, organizations, etc., common to EOC programs. Just as benefits are available from the similarities between EOC programs, benefits are also available from the similarities of separate but interrelated programs. Several maintenance programs have been established in the past to solve particular operational or maintenance problems, improve material condition, or increase operational availability. In this respect, they are related to EOC programs. Therefore, it would be advantageous for EOC programs to draw from the experience acquired and the effective results produced over the years. The GWSRP is one of the established maintenance programs where coordination with the DDEOC Program exists and should be continued. The similarities of GWSRP and DDEOC should be coordinated to a common goal, thereby minimizing conflicts and duplication in requirements, procedures, funding, etc.

1.3 STUDY APPROACH

The initial steps of this analysis were to (1) identify the various activities of the GWSRP and DDEOC Program organizations, (2) identify and assess the various activities' responsibilities, (3) determine which activities would be involved with some aspect of support to the gun weapon system, and (4) develop recommendations for coordination between the two Programs.

Documentation covering management procedures, instructions, manuals, and associated data relative to the interface and support with gun weapon systems was collected for each activity of interest -- i.e., those that would be participating in the coordination and integration efforts. ARINC Research engineers studied this information and utilized existing in-house expertise (established in support of the DDEOC Program and various gun weapon system studies) before visiting each activity for interviews. The

discussions were held to enhance our understanding of each activity's responsibilities and to allow each participant to express his opinions on the appropriate areas of Program interface.

Following the data-collection, assessment, and discussion process, an initial selection of mutual interest areas was made. This list was discussed further and refined with the interacting activities to reaffirm its validity, implementation feasibility, and integration desirability.

The final phase of the effort was to develop conclusions and recommendations based on the analysis.

1.4 REPORT ORGANIZATION

Chapter Two of this report describes the key activities and their responsibilities within the GWSRP and the DDEOC Program. Chapter Three explains the results of the analysis conducted to determine the common interests in coordination shared by the GWSRP and the DDEOC Program. Chapter Four presents the conclusions and recommendations.

CHAPTER TWO

ORGANIZATIONAL RELATIONSHIPS

2.1 INTRODUCTION

Several activities within the GWSRP and DDEOC Program are providing management and maintenance support of gun weapon systems and equipments. The support provided by both organizations is conducted toward the same end, providing adequate operational availability of these systems to the Fleet. It should be noted that the DDEOC Program provides maintenance management support to the total ship; the support of gun weapon systems is but one area of that support. This chapter identifies the various participating activities and their roles and responsibilities. Figure 2-1 and 2-2 show the working relationships of the activities for each program. The potential contributions and relationship to the integration effort are also discussed.

2.2 GUN WEAPON SYSTEM REPLACEMENT PROGRAM ORGANIZATION

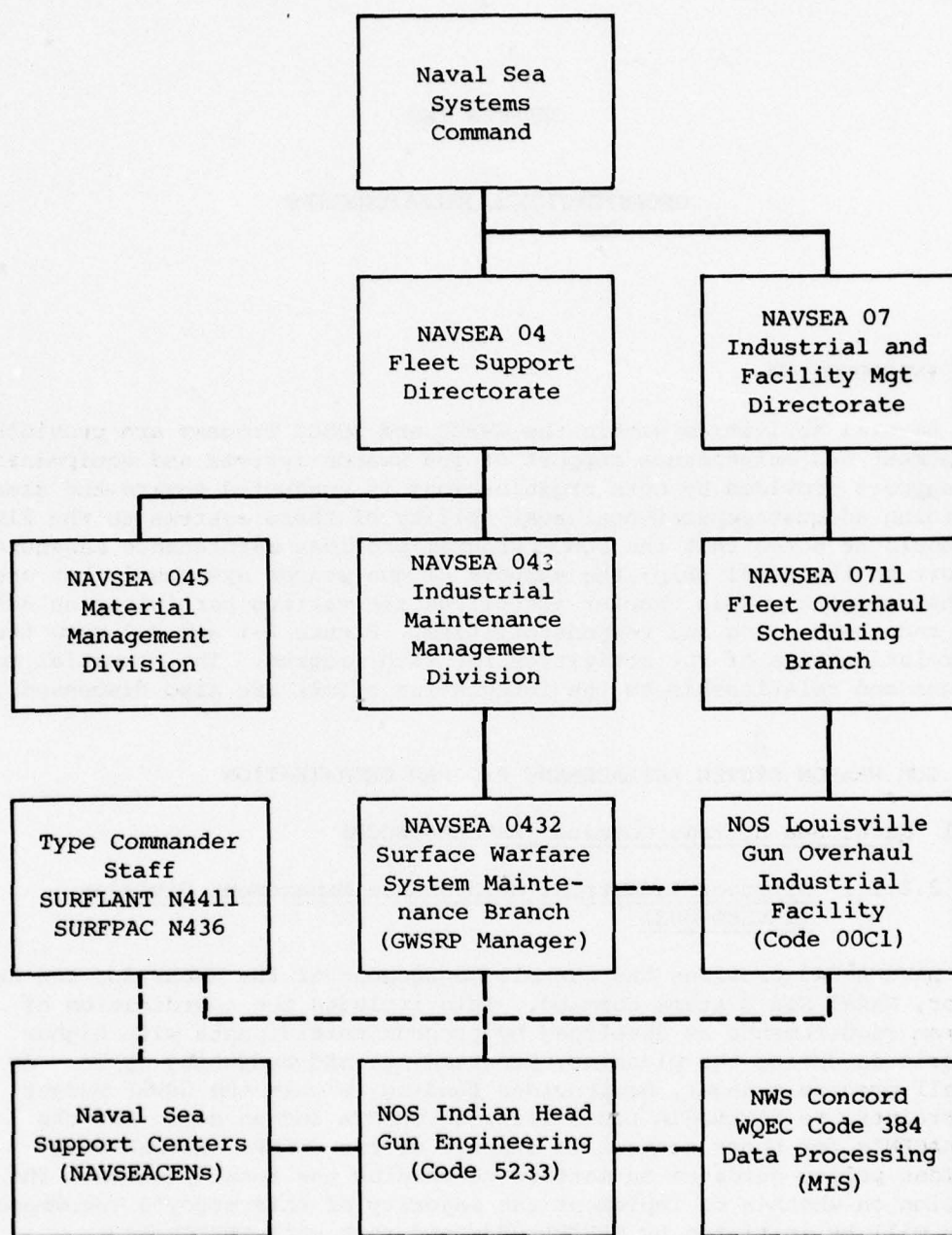
2.2.1 Naval Sea Systems Command (NAVSEASYSKOM)

2.2.1.1 Director Industrial Maintenance Management Division (NAVSEA-043)

NAVSEA-043 provides the overall management of the GWSRP for the Commander, Naval Sea Systems Command. This includes the coordination of program requirements as developed by program participants with higher authorities during the planning, programming, and budgeting cycle. As overall program manager, he provides funding, within the GSWRP budget constraints, to NAVORDSTA Louisville, NAVORDSTA Indian Head, and the NAVSEACEN's for those actions in support of the GWSRP. NAVSEA-0432 provides policy guidance on matters concerning the total program. The decision on whether to implement the majority of this study's recommendations will be initiated by NAVSEA-0432 and rest with NAVSEA-043.

2.2.1.2 Director Material Management Division (NAVSEA-045)

NAVSEA-045 provides the administrative management and funding for packing, crating, and handling (PC&H) equipment removed from ships via GWSRP that is not directly returned to NAVORDSTA Louisville. This office also controls all 2J cognizant (cog) assets in the Navy and must be interfaced with to ensure that the assets will be available to support GWSRP requirements. The 2J cog represents the major component level supply support code for gun weapon systems.



Legend:

- Direct Organization Relationships
- - - Working Interfaces

Figure 2-1. GWSRP AND INTERFACING ACTIVITIES

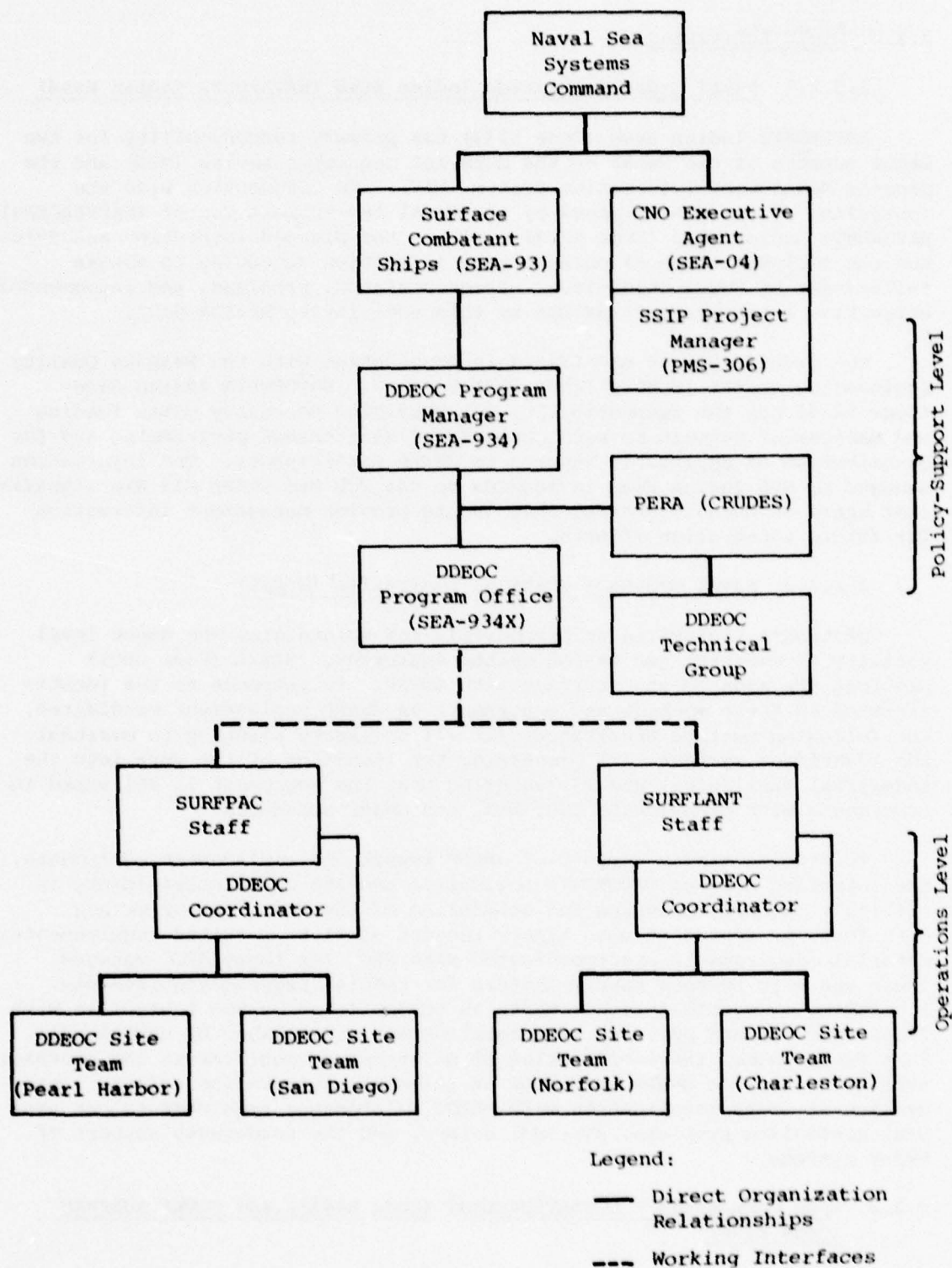


Figure 2-2. DDEOC ORGANIZATIONAL RELATIONSHIPS

2.2.2 Field Activities

2.2.2.1 Naval Ordnance Station, Indian Head (NAVORDSTA Indian Head)

NAVORDSTA Indian Head (Code 5233) has primary responsibility for two major aspects of the GWSRP -- the Material Condition Review (MCR) and the program Management Information System (MIS). In conjunction with the scheduling of the MCRs planned by the Naval Sea Support Center (NAVSEACENS), NAVORDSTA Indian Head (Code 5233) monitors the planned inspection schedules and the implementation of current year inspection schedules to ensure fulfillment of GWSRP objectives. Program status, problems, and recommended corrective actions are forwarded by this activity to NAVSEA-0432.

The program MIS is maintained in conjunction with the Weapons Quality Engineering Center (WQEC), (Code 384) Concord. NAVORDSTA Indian Head (Code 5233) has the responsibility for providing necessary data, funding and management support to WQEC Concord for maintenance programming and for distribution of applicable reports to GWSRP participants. The information managed by NOS Indian Head in regards to the MCR and GWSRP MIS are significant areas of mutual interest that should provide management information for future integration efforts.

2.2.2.2 Naval Ordnance Station, Louisville (NOS/L)

NAVORDSTA Louisville is responsible for maintaining the depot level facility to overhaul gun weapon system equipment. NOS/L (Code 00C1) provides the management interface with GWSRP. In response to the identification of these systems and equipments as GWSRP replacement candidates, the following must be undertaken: (1) all necessary planning to overhaul the identified systems, (2) processing the induction of the work into the industrial facilities, and (3) ensuring that the equipment is delivered in accordance with promulgated BOH, ROH, and GWSRP schedules.

To provide timely support of GWSRP rework and replacement equipments, the interface between NAVORDSTA Louisville and the GWSRP participants is critical. Orderly planning and scheduling of the NOS/L resources and work force is dependent upon timely receipt of Fleet workload requirements. Material requirements are coordinated with SPCC for those SPCC managed items and with Defense Supply Centers for special program requirements. Scheduling of workload requirements is accomplished by NOS Louisville with final approval and priority of accomplishment established by NAVSEA 0711. This factor makes the coordination of maintenance requirements and overhaul scheduling between GWSRP and DDEOC an essential integration effort. Integration of GWSRP requirements with DDEOC maintenance requirements can prevent scheduling problems, overhaul delays, and the inadequate support of GWSRP systems.

2.2.3 Type Commanders - COMNAVSURFLANT (Code N4411) and COMNAVSURFPAC (Code N436)

The TYCOMs are active participants of both Programs. Their participation is unique in that they have vested interest -- the continuing operation

of ships within their command -- in making each Program responsive to their maintenance requirements. The TYCOMs, Code N4411 for COMNAVSURFLANT and Code N436 for COMNAVSURFPAC, are responsible to formulate requests submitted to NAVSEA for replacement of GWSRP system and equipments aboard their ships that have been identified as requiring replacement. This process involves directing the availability of the ships for inspection and replacement action. Under the GWSRP, the TYCOM will fund all removals, installations, and checkouts of the replaced equipments. They also fund all TYCOM initiated changes to GWSRP workload for the current or subsequent fiscal year (FY).

The TYCOM interaction within the GWSRP is the input that provides the program with overhaul requirements. The coordinated TYCOM requests for inspections or replacement of GWSRP equipments provides the justification for funding allocations within the Navy for this program. It is imperative that the TYCOM be aware of DDEOC maintenance requirements engineered for these systems and equipments and that these requirements are included in his requests to NAVSEA for support.

2.2.4 Other Activities

2.2.4.1 Naval Sea Support Center (NAVSEACEN) - Atlantic/Pacific

The NAVSEACENS provide SEA-043 technical representation and general liaison to the TYCOM and the Fleet at the waterfront on matters concerning the GWSRP. To accomplish this, a schedule for MCRs is planned and submitted semiannually for approval in support of GWSRP objectives. The NAVSEACENS conduct the Material Condition Review using provided material inspection formats and forwarding the written reports to the appropriate GWSRP participants. When designated by the TYCOMs the following activities are conducted in support of GWSRP:

- (1) Removal and installation of GWSRP equipments and components
- (2) Delivery of documents and appropriate OP/ODs on refurbished equipments to an installation activity
- (3) Monitoring and informing all concerned of the shipping status of refurbished equipment
- (4) Inspecting refurbished equipment upon receipt with installing activity and take action to obtain shortages
- (5) Providing technical assistance during the installation and check out of refurbished equipments
- (6) Reporting completion of installation while documenting ship's equipment configuration

GWSRP is also responsible for determining an equipment's "reworkability" and, upon receipt of disposition instruction from NAVSEASYSOM, providing direction and funding to Naval Supply Centers to ensure proper packing, crating, and handling of equipments being returned in the GWSRP pipeline. The NAVSEACENS, because of their direct interface with the

ship's and the GWSRP systems and equipments, are key technical activities in the process of supplying inputs to the integration effort required to ensure GWSRP equipments are properly supported. The contributions NAVSEACENS can make to ensure these equipments receive the necessary engineered operating support will be an integral portion of this integration effort. The inspection and evaluation they performed on these equipments provide a portion of the data and engineering knowledge required to ensure both programs are responsive in this area to the needs of the Fleet.

2.2.4.2 Weapons Quality Engineering Center, NWS Concord

WQEC, Concord (Code 384) maintains in conjunction with NOS Indian Head (Code 5233), a program Management Information System (MIS) for the GWSRP. This activity manages the programming, compiling, file update, and information outputs of the GWSRP management information system.

2.3 DESTROYER ENGINEERED OPERATING CYCLE PROGRAM ORGANIZATION

2.3.1 Policy Support Activities

2.3.1.1 Ship Support Improvement Project Manager (PMS-306)

PMS-306 is responsible to SEA-04 for executing the functions assigned to SEA-04, the CNO's Executive Agent for the Ship Support Improvement Project (SSIP). Those functions describe a basic requirement for the integration of the DDEOC Program into the SSIP. In addition, PMS-306 as Project Manager is responsible for:

- Project resource accounting
- Coordinating and integrating the program components, including DDEOC, that constitute the SSIP
- Coordinating with program managers, such as SEA-934 for DDEOC, to ensure compatibility with the development of the overall maintenance strategy

A significant interface with PMS-306 that should be continued is the review by GWSRP of those gun weapon system rotatable pool candidates recommended by DDEOC ship's Class Maintenance Plans for inclusion within the Wholesale System Stock Requirements. In addition, NAVSEAINST 5400.11A states, "where significant and continuing interrelationships with other projects and functional managers work out, PMS-306 shall take the initiative to develop agreed working relationships with such managers". This specifically addresses the type of integration effort proposed by this analysis.

2.3.1.2 Deputy Commander, Surface Combatant Ships, Naval Sea Systems Command (SEA-93)

SEA-93 is responsible for directing and executing the DDEOC Program.

Additional responsibilities are to:

- Appraise and determine the necessity, adequacy, and consistency of all DDEOC resource requirements
- Provide SEA-04 with DDEOC Program resource requirements, including appropriate justification and back-up documents

2.3.1.3 Escort/Cruiser Logistics Division, (SEA-934)) DDEOC Program Manager

SEA-934 is responsible to SEA-93 for the planning and execution of the DDEOC Program. Those responsibilities are comprised of the following major program elements:

- Developing an integrated ship maintenance strategy to be used in support of ships assigned to the DDEOC Program
- Planning and coordinating Baseline Overhauls, Selected Restricted Availabilities (SRAs), and follow-on Regular Overhaul of DDEOC ships
- Developing ship Class Maintenance Plans that are the basis for planning and resource identification for DDEOC overhaul and maintenance support
- Identifying hardware requirements and the software resources required to implement DDEOC

SEA-934 will be the key DDEOC Program interface for the GWSRP. The responsibilities assigned to this office are such that the management decisions covering every facet of the mutual interest areas would be made ultimately at this level. Program coordination of these interests will, in most instances, be accomplished between SEA-0432 and Project Office (SEA-934X).

2.3.1.4 Planning and Engineering for Repairs and Alterations (PERA) - Cruiser and Destroyer (CRUDES)

PERA (CRUDES) comes under the cognizance of the Cruiser, Destroyer, and Frigate Ship Logistic Division (SEA-934) - the DDEOC Program Manager. The primary objective of PERA (CRUDES) is to provide close management of planning to achieve effective, efficient, orderly and timely ship overhauls. To accomplish this, PERA (CRUDES) assists the DDEOC Project Office in the following areas:

- Planning and coordinating the development of the repair package for each assigned ship overhaul
- Developing a ship alteration and repair package (SARP)
- Identifying material that requires a long lead time for delivery

- Installing Ship's Force Overhaul Management System (SFOMS) on all ships undergoing overhaul
- Applying historical data toward development of baseline SARPs and POT&Is

PERA (CRUDES) is responsible to the DDEOC Program Manager for providing several technical project inputs in support of DDEOC, e.g., development of Class Baseline SARPs, Material Condition Assessment Procedures, the software for Repair Maintenance Management System (RMMS), etc. NAVSEA resources have been provided for the accomplishment of the DDEOC tasks. The integration of many mutual interest areas will begin with PERA (CRUDES) for purposes of defining the scope and mechanics of the integration.

2.3.2 Operational Level Activities

2.3.2.1 DDEOC Technical Groups

Although program direction comes directly from the DDEOC Program Office, the DDEOC Technical Group is located in PERA (CRUDES) for administrative support. The DDEOC Technical Group provides dedicated technical support to the DDEOC Program as follows:

- Conducts trend analyses based on DDEOC site team data
- Provides repair accomplishment recommendations to PERA (CRUDES) availability planners
- Proposes changes to existing DDEOC assessment procedures
- Recommends new systems and equipments for development of assessment procedures
- Provides specialized material support to the DDEOC site teams
- Recommends to the DDEOC Program Office changes to staffing levels or other staffing actions required to support the program

The staffing of the DDEOC Technical Groups at PERA (CRUDES) has not been completed. Integration efforts at this level are concerned primarily with the recommendations made for repair accomplishment resulting from data analysis.

2.3.2.2 TYCOM DDEOC Coordinator

The function of the TYCOM DDEOC Coordinator is to provide support for the DDEOC Program and implementation guidance to TYCOM staff elements, IMAs, and DDEOC ships. The TYCOM Coordinator, who, according to planning, will be a Naval Officer with DD or FF engineering experience, will have the following responsibilities:

- Develop DDEOC Program milestones at TYCOM level
- Monitor the scheduling of major maintenance to DDEOC ships

- Develop DDEOC operations-level budget submissions
- Recommend DDEOC-related maintenance actions
- Recommend DDEOC-related supply actions
- Monitor DDEOC Program material and personnel resources
- Review DDEOC-related 3-M feedback reports
- Provide monitoring-schedule guidance to DDEOC site teams
- Recommend "D" and "F" Alts for accomplishment during DDEOC ROHs and SRAs and coordinate with NAVSEA FMP managers
- Coordinate Selected Restricted Availability planning
- Provide program briefs to new DDEOC ships' Commanding Officers and others, as necessary, in conjunction with the DDEOC Program Manager

The current DDEOC management planning calls for the TYCOM Coordinator to be assisted in the above effort by a Maintenance Planning Officer and a DDEOC Supply Planning Officer. The interface at this level of the DDEOC Program would be to tie together the TYCOMs' vested interests in both Programs to the common, maximized support of GWSRP systems and equipments on TYCOM ships.

2.3.2.3 DDEOC Site Teams

The equipment and systems assessment requirements of the DDEOC Program requires testing and record keeping in addition to current Fleet practices. In order not to overburden Forces Afloat personnel and to ensure continuity in the application of assessment methods, DDEOC site teams at major DDEOC-ship home ports will either conduct assessment procedures themselves or assist Ship's Force in conducting them. The DDEOC site team receives program-policy direction from the DDEOC site team leader in conjunction with the DDEOC Coordination on the Type Commander's staff and receives technical guidance from the DDEOC Technical Group.

The DDEOC site teams will:

- Administer the DDEOC Program at the home port assigned
- Coordinate assessment visits with Squadron Material Officers and the ships concerned
- Conduct initial "quick-look" analyses of data recorded on DDEOC ships in conjunction with the ship's Engineering Officer and Commanding Officer, if requested
- Immediately advise ship's Commanding Officer, Engineering Officer, and Squadron Material Officer of any significant problems indicated by shipboard assessment procedures
- Submit, at the end of each assessment visit, a report of recommended maintenance actions, as appropriate

- Forward recorded assessment data to the DDEOC Technical Group for analysis
- Be responsible for accountability and working condition of any special DDEOC assessment equipment assigned
- Recommend revisions to DDEOC assessment procedures, as appropriate
- Participate in shipboard briefings with DDEOC Program Manager
- Participate in development of Material Condition Assessment procedures
- Carry out other duties as assigned

The proposed composition of the DDEOC site teams is primarily HM&E oriented. This may provide a problem for assessing the gun weapon systems. Integration of potential GWSRP assets in this area could prove to be a definite benefit to both programs.

2.4 SUMMARY

This chapter has discussed the selected key activities involved in the GWSRP and DDEOC Program. They will interrelate in varying degrees for the future maintenance requirements specified on the GWSRP systems and equipments. A summary matrix of the participating activities and their interrelating responsibilities is shown in Table 2-1.

Table 2-1. PROGRAM INTERRELATIONSHIPS		
GMSRP Responsibility	Gun Weapon System Maintenance Management Functions	DDEOC Program Responsibility
NAVSEA-043 provides overall management of the GMSRP for the Commander, Naval Sea Systems Command.		NAVSEA-934, the DDEOC Program Manager, along with the aid of SEA-934X (Project Office) is responsible for the planning and execution of the DDEOC Program and all related shipboard systems including gun weapon systems.
NAVSEACENS (Atlantic/Pacific) provide technical representation for SEA-043 and liaison with the Type Commanders on matters relating with GMSRP.	Program Management Program Technical Support	PERA (CRUEDES) is responsible to the DDEOC Program Manager for providing intensive management of planning ship overhauls including gun weapon system requirements. Additional support comes from the DDEOC Technical Group working out of PERA (CRUEDES).
NAVSEA-0432 is responsible to SEA-043 for coordinating the GMSRP program requirements during planning, programming, and budgeting cycle.	Program Scheduling	NAVSEA-934X is responsible for the development and promulgation of Class Maintenance Plans in addition to BOW, ROW, and SPA requirements and scheduling.
NOS Indian Head in conjunction with WJEC Concord is responsible for providing the management and software support of the GMSRP Management Information System.	Management Information Systems	PERA (CRUEDES) is responsible for developing the software for the Repair Maintenance Management System (RMS) to be utilized for DDEOC availability planning.
NAVSEA-043/045 are responsible for the funding and control of all 2J assets utilized by GMSRP. SPCC and FMSO are responsible for advance procurement planning of Gun Weapon System related parts, components, and equipments required by the Navy.	Material Support	NAVSUPSYSCOM provides DDEOC commodity management and procurement services in support of the Fleet Modernization Program and for those items assigned to NAVSUP for inventory management.
NAVSEA-0432 is responsible for coordinating program requirements such as rotatable pools, with higher authority.	Ship Support Improvement Projects	PMS-306 is responsible to SEA-04 for execution of those Ship Support Improvement Project functions assigned to SEA-04. Coordination of rotatable pool inputs to the Wholesale Systems Stock Requirements is one such function.
NAVSEACENS provide technical representation for NAVSEA-043 and conduct the Material Condition Reviews (MCR) for GMSRP.	Material Condition Assessment	DDEOC Site Teams will conduct or assist the Ship's Force in the performance of DDEOC assessment procedures at the home-port assigned.
NAVSEACENS are responsible for identifying corrective maintenance actions required on Gun Weapon Systems during conduct of MCRs. NOS/L is responsible for recommending the procedures and technical check sheets utilized to conduct the MCRs.	Maintenance Requirements Planning	NAVSEA-934X is responsible for developing the Class Maintenance Plans and identifying hardtime intracycle maintenance and repair actions. PERA (CRUEDES) is responsible for generating Class Baseline SAPPs, Bid Specifications, and Post Repair Test and Certification Plans.

CHAPTER THREE

DATA ANALYSIS AND MUTUAL INTEREST AREA IDENTIFICATION

3.1 INTRODUCTION

Chapter Two described the various activities that interact directly or indirectly with the GWSRP and the DDEOC Program. Visits and/or phone conversations were made with these activities to identify and define areas of mutual interests that could potentially be implemented in the interest of improving existing procedures. This chapter addresses the data collection process and the data analysis. The analysis leads to the recommendation of eight areas of mutual interest whose integrated implementation is feasible and likely to provide benefits to both the GWSRP and the DDEOC Program.

3.2 DATA COLLECTION

Data collection began with a search for all relevant documentation concerning both Programs. To gain an understanding of each Program's charter and responsibilities, the following documents were used primarily: (1) NAVSEA Instruction 8300.2A - Gun Weapon System Replacement Program, (2) Gun Weapon System Replacement Program Guidance Manual, and (3) The DDEOC Program Management Plan. Subsequently ARINC Research studied the primary document describing the Gun Weapon System Replacement Program - NAVSEAINST 8300.2A. This instruction establishes the policy and procedures for implementing the GWSRP, defines areas of funding responsibilities, and establishes procedures for developing requirements-planning data for the GWSRP schedule. Included in the text of the instruction is a listing of the Program's active participants and their responsibilities.

The Gun Weapon System Replacement Program Guidance Manual is used within the program by the active participants for further refinement and definition of the GWSRP. ARINC Research engineers used this document to become aware of technical details concerning the Program's reference material, system/equipments/components supported, and operational activities and responsibilities of the participants.

Of major interest was the DDEOC Management Plan. This was written to serve as a guide to DDEOC managers for the execution of the DDEOC Program. It includes a discussion of the Program's background, objectives,

and constraints; an outline of the organizational structure used for program administration; the DDEOC availability planning procedures; a description of the DDEOC material condition assessment program; and a discussion of related Integrated Logistic Support interfaces. This document is a means for the DDEOC Managers to provide for review, coordination, and further DDEOC Program development. It is a dynamic document intended to provide the most current management information to program management.

Study of these documents provided the foundation for understanding the problems unique to each program, for analyzing areas of mutual interest and ultimately determining whether existing procedures could be improved to the benefit of both Programs through integration of the mutual interest areas. The majority of information and the actual analysis process, however, was gained by interviews with active participants of both Programs.

For several reasons, significant contact was with the GWSRP participants: (1) the GWSRP has been functioning in support of Fleet Gun Weapon System Maintenance, (2) the GWSRP system comprises only a small portion of the total ship for which the DDEOC Program is responsible, (3) it is important to assess the impacts that DDEOC has on existing GWSRP procedures, (4) there was more data available on the GWSRP than on the DDEOC Program, and (5) ARINC Research's long-standing association with DDEOC made communication and assessments of planning and requirements much easier than the corresponding effort with the GWSRP.

The following bibliography represents the documentation for the conclusions and recommendations of this report:

A. Gun Weapon System Replacement Program References:

1. NAVSEA Instruction 8300.2A of 24 March 1977, Gun Weapon System Replacement Program.
2. Attachment to NAVSEA Instruction 8300.2A (Advanced Copy), Material Condition Review Program.
3. GWSRP Guidance Manual (Draft) dated January 1978.
4. Naval Ordnance Station Louisville Booklet for Depot Level Overhaul, Ordnance Systems - Equipments to be Removed.
5. Semi-Annual GWSRP Planning Meeting Notes of 20 April 1978.
6. Naval Sea Systems Command Journal Article (Draft), "The Maintenance Behind Guns" by the GWSRP Program Manager.
7. GWSRP In-Depth Review for Fiscal Year 1978.

B. DDEOC References:

1. DDEOC Management Plan of November 1977.
2. EOC Program Development Manual, Draft of February 1978.

3. FF-1052 Class DDEOC Maintenance Plan.
4. PERA (CRUDES), Surface Ship Pre-Overhaul Planning Guide.
5. PERA (CRUDES), Baseline SARP for FF-1052 Class BOH.
6. Maintenance Critical Equipment List for Three Ship Classes; FF-1052, CG-16, and CG-26.
7. DDG-37 Class SARP Planning Document.
8. OPNAV Notice 4710 of 3 February 1978, Pacific and Atlantic Fleet Overhaul Schedules for Fiscal Years 1977-1983.
9. Ship Support Improvement Project (PMS-306) Project Master Plan with Change 3 of November 1977.
10. DDEOC Systems Maintenance Analyses for appropriate GWSRP Systems and ship classes (Mk 42 Gun Mounts, Mk 68 Gun Fire Control Systems).

C. Other References:

1. Reliability-Maintainability-Availability Assessment of 3"/50 Rapid Fire Twin Gun Mounts of January 1975.
2. Reliability, Maintainability, and Availability Assessment, Mk 42 Mod 10 Gun Mount of 1 December 1977.
3. FF-1052 Class Post Repair Test and Calibration Plan, Combat System and Gun System Volumes.

During the first month of this effort, ARINC Research representatives attended the semi-annual GWSRP scheduling meeting. This meeting convenes with the objective of accomplishing the following: (1) developing baseline GWSRP schedule for FY + 1, (2) identifying baseline GWSRP replacement requirements for FY + 2, and (3) developing a baseline inspection schedule for FY + 1. This meeting was attended by personnel from many activities, including NAVSEA 0432 (Chaired the meeting), NAVSEA-06G, NAVSEA-0711, NAVSEA-6532, COMNAVSURFLANT, COMNAVSURFPAC, NAVSEACENLANT, PAC, SPCC, NAVSEA Concord, NOS Louisville, and NOS Indian Head. As a result of the conversations with the personnel from these activities a list of potential mutual interest areas was developed for further investigation. This list served as a starting point within the GWSRP community for investigating other requirements for action, feasibility of implementation, and need for interface with DDEOC. Although inputs from the entire community were intended to be an integral part of the analysis, it was evident from the discussions with personnel in both Programs that there is a lack of understanding that ranges from misconception to total unawareness of what the other Program does. This often caused a void in the data feedback because some aspects of one Program were unknown to the participants of the other Program.

3.3 INITIAL IDENTIFICATION OF MUTUAL INTEREST AREAS

As a result of the preliminary research two themes for areas of mutual interest were established. Mutual Program interests can be defined as areas

of similar ongoing work, areas of projected development, areas of potentially similar manpower requirements, areas of funding responsibility, etc. The two themes developed are the following:

1. Identification of the functions, assignments, and responsibilities (FAR) necessary to implement effective maintenance and overhaul of GWSRP equipments throughout the DDEOC.
2. Identification of the potential sources of funding to be dedicated for the implementation of the GWSRP requirements developed within the framework of DDEOC which are not adequately supported.

The specific elements of both programs that should be considered in the further subdivision of the broad mutual interest areas will be briefly addressed. These potential integration elements are referenced to the elements of the DDEOC Management Plan which is presently being used as a guide to DDEOC managers for the execution of the DDEOC Program.

The following potential integration areas were identified relative to theme 1:

- Material Condition Review/Pre-Overhaul Test and Inspection. GWSRP equipments presently have a material condition review conducted prior to overhaul. This inspection is conducted by field representatives of the NAVSEACENS. The POT&I is also performed to determine overhaul and RAV requirements. These inspections should be researched to determine the extent of duplication/potential integration.
- Repair Package Development. NAVSEA-934X is responsible for developing the "Class Maintenance Plans" and identifying hardtime intracycle maintenance actions and repair actions contingent upon condition assessment trend analysis. Methods to integrate GWSRP data/engineering expertise on a continuing basis should be researched.
- Class Baseline SARP. PERA(CRUDES) is responsible for generating the class baseline SARP. The extent of present interface between the GWSRP and PERA(CRUDES) in this effort should be identified. If determined to be necessary, methods to integrate GWSRP data/engineering expertise into this process should be identified.
- Bid Specifications for Private Yards' ROH/BOH. PERA(CRUDES) is tasked to produce the bid specifications for the overhauls to be conducted in private shipyards. GWSRP data/engineering expertise should be interfaced with PERA engineers in an attempt to produce more definitive bid specifications for gun weapon systems.
- Post Repair Test and Certification Plans. PERA(CRUDES) is responsible for producing the specifications of these plans. This is another area where the potential exists for DDEOC to draw from the data/engineering expertise managed within GWSRP. Also the applicability of interfacing all or elements of existing test programs on combat systems as the CSRR and CSRT should be investigated.

- Material Condition Assessment Procedure-Development and Review. PERA(CRUDES) is responsible to NAVSEA-934X for the development and review of MCA procedures. For those GWSRP equipments selected for MCA, interface efforts investigated for the possible inclusion of GWSRP data/engineering expertise in the development process.
- DDEOC Site Teams. Several responsibilities assigned to the site teams -- i.e., development of assessment procedures, recommendations of equipments to be assessed, and inspection scheduling -- will impact the material condition of designated ships' equipments. Present site team manning authorization shows the potential to expand contact system expertise. The possibility of upgrading the combat system expertise should be investigated.
- Data Exchange. The proposed intracycle management data base system -- Repair Maintenance Management System (RMMS) is a computer aided management tool being developed by PERA(CRUDES). Research should be conducted to assess the interface possibilities between RMMS and the GWSRP MIS.
- Class Maintenance Plan (CMP). SEA-934X is responsible for development of the CMP. The CMP includes anticipated maintenance tasks, their frequency, and estimated man-hour requirements to accomplish periodic restorative maintenance. Maintenance requirements involving the Gun Weapon System should be analyzed with a coordinated GWSRP input to ensure that only necessary repairs are accomplished on those equipments not being replaced.

Prior to identifying the potential integration areas under Theme 2, the following should be taken into consideration. DDEOC requirements that generated maintenance costs in excess of previous maintenance experience were to be used as justification for submittal of increased funding requests in the POM. The analysis of funding areas should identify areas where this process was not enacted, those areas where funding has not been allocated in quantities prescribed by DDEOC engineering analysis, and areas of apparent shortages or excesses. The following potential integration areas were identified relative to Theme 2:

- BOH Funding. The BOH for the DDEOC classes requires maintenance funds in excess of a "normal" overhaul due to increased work requirements. Adequacy of BOH funding should be addressed by comparing the POM funds requested based upon DDEOC requirements with the funds currently allocated for the BOH.
- GWSRP System/Equipment Component Replacement. The GWSRP program provides the funding for complete overhaul of its cognizant system/equipments. As maintenance requirements identify more component replacement vice complete system overhaul, the methods/means to support this replacement must also be identified.
- Rotable Pool Funding. Rotable pool requirements for GWSRP systems/equipments to support DDEOC class maintenance plans must be identified along with the source of funding.

These mutual interest areas represented the significant findings based on the discussions held. It was necessary to conduct further analysis to determine the validity of each specific area, the desirability of implementing each, and the feasibility of implementing each in an integrated manner to achieve tangible benefits for each Program.

3.4 MUTUAL INTEREST AREA REFINEMENT

This section will describe the results of the analyses used to select the mutual interest areas whose implementations are most necessary to coordinate the GWSRP with the DDEOC. It should be recognized that this does not represent the complete requirements for GWSRP/DDEOC integration. As further investigations are conducted, the analyses will most likely develop new areas of needed coordination. Additionally, both programs are dynamically managed so that their individual charters will probably bring about unresolved questions of mutual program interests which will identify needed dialogue and interface.

Each of the following sections -- 3.4.1 through 3.4.8 -- identifies one of eight selected mutual interest areas and describes the findings that lead to its final inclusion in the list recommended for implementation. The selection was based largely on the discussions and desires of NOS Indian Head and NAVSEA 0432. These impressions were further discussed and coordinated with the DDEOC Program Officer, PERA (CRUDES), and the TYCOMs.

The narrative in each section represents a compilation of the various discussions. The discussions were analyzed against existing documentation, management plans, instructions, etc., to determine the most advantageous means of identifying future integration recommendations. The list is not presented in any order of significance.

3.4.1 Integration of Material Condition Review (MCR) and Pre-Overhaul Test and Inspections (POT&I)

The Gun Weapon System Replacement Program provides for an inspection of all gun weapon systems installed on ships identified by the Type Commanders as having equipment requiring replacement or whose last MCR is over three years old. This inspection is conducted by the NAVSEACENS on each coast. They use a MCR manual that contains procedures and check lists from which to evaluate and comment on the observed condition. Similarly, prior to major overhauls, the Pre-Overhaul Test and Inspection (POT&I) is conducted on the gun weapon system as a means of identifying the systems' material condition and required overhaul repairs. The inspections are similar both in equipments checked and procedures used. The estimates given by the NAVSEACENS concerning the manning and man-hours required by both inspections were approximately equivalent. Initial indications show that neither of the two inspections is any more comprehensive or significantly more cost effective than the other. The single greatest area of deviation in the procedures utilized for both inspections is the formatting of the results. The MCR utilizes a series of check off

sheets and system/equipment summary sheets. The formats utilized for the POT&Is vary from inspection to inspection. There was concurrence from the NAVSEACENS, NAVSEA-934X, PERA (CRUDES), and GWSRP program management that the integration of these efforts was desirable and feasible. There were various suggestions made on how this could be accomplished. PERA (CRUDES) emphasized that this effort should address three areas of implementation:

1. Documentation
2. Inspection team
3. Periodicity

Investigation of these three areas could result in development of a comprehensive and standardized plan that would provide the shore and afloat communities with an exact management tool for planning this inspection.

The following primary suggestions were made concerning this effort by several of the activities interviewed:

1. Integrate the MCR and POT&I into a single inspection.
2. Continue to conduct both the MCR and POT&I but create procedures that specify inspection dependency. An example of this would be to have the MCRs precede the POT&Is and let its results dictate the need or level of POT&I conducted.
3. Produce standardized MCR procedures with an accompanying scheduling agenda that can be utilized as the POT&I plan for gun weapon systems.

Of the three recommended approaches, incorporation of standardized MCR procedures as part of the POT&I plan appears to offer the best means for integrating these two inspections.

3.4.2 GWSRP Input to Bid Specification

The area of bid specifications was raised as a potential integration concern by several of the GWSRP activities. Bid specifications have been utilized as the standard means of establishing contracted requirements and therefore are not unique to the DDEOC or GWSRP programs. The importance of investigating this area is twofold:

1. TYCOM interview indicated the major overhauls for the gun weapon systems require an inordinate amount of post overhaul repairs to bring systems to acceptable operable conditions.
2. The DDEOC program emphasizes the need for standardized levels of acceptable material condition throughout each class. The bid specifications could serve as the means for correcting deficiencies. Further engineering analysis must be conducted to determine the extent and causes of post overhaul repairs actually required. The GWSRP managers could provide a definitive input to the PERA (CRUDES) planners on the specific requirements needed to bring the gun weapon system up to the requisite configuration. This would also provide the DDEOC managers with a standardized level of material condition expected as a result of the overhaul.

The NAVSEACENS along with the TYCOMs provided the most significant input relating to this mutual interest area. As a result of the numerous inspections, technical assists, and corrective maintenance actions provided to the TYCOMs to correct gun weapon system deficiencies, the NAVSEACENS expressed the need to provide the TYCOMs with an improved means of accountability of work accomplished on these systems in the shipyard. This would include specifications covering the entire process from removal, repair, to installation of these systems, in spite of the fact that the yards are often only required to perform removal and installation of systems overhauled in NOS Louisville. The TYCOM staffs are concerned with this problem because of their experiences of costly ROH expenditure overruns in both time and money and the resultant loss of ship availability in the applicable mission area.

PERA (CRUDES) provides the bid specifications for the DDEOC Program. As the coordinators of this DDEOC input, the PERA (CRUDES) planners were in favor of more definitive specifications for the overhaul of these systems. The approach offered by PERA (CRUDES) was to have a standardized bid specification written for the turnaround of a gun weapon system. This specification would be similar to a Technical Repair Standard, yet written in bid specification language. By preparing a bid specification utilizing the expertise within the gun community, the overhaul planners could be confident that the bid specification would represent the requisite repairs needed to bring the system to the desired overhaul configuration.

Although this investigation did not analyze the amount of savings that can be realized from more definition on these bid specifications, all parties interviewed predicted this as a potential area of increased savings to the TYCOMs overhaul maintenance funds.

3.4.3 Baseline Overhaul (BOH) Requirements

The Baseline Overhaul (BOH) has been established as a prerequisite for ships entering the extended operating cycle in the DDEOC Program. The Engineered Operating Cycle (EOC) is that period of time from the completion of a DDEOC ship's overhaul through the normal operating period and subsequent Regular Overhaul (ROH). Therefore as each DDEOC ship enters the program, it will undergo an initial BOH and then enter its EOC as prescribed in the CMP. The key elements that will be established upon completion of BOH are the DDEOC Class Configuration Baseline and the DDEOC Class Material Condition Baseline. The configuration and material condition of a given ship completing BOH will be stated in terms of exceptions to the class baseline definitions. The importance of correctly determining those requirements to be included in the BOH is important to the success of the DDEOC Program. Failure to include an overhaul requirement could result in lack of depot level repair maintenance for a period of 4 to 5 years in addition to the time it last experienced repairs in an ROH.

A research of the FF-1052 and DDG-37 Class BOH requirements specified for the gun weapon systems was made. Absent from both of the BOH requirements were any repair requirements on the 5"/54 Mk 42 gun mounts. Although

no repair requirements were specified, discussions with NAVSEA-043 personnel indicated this was a proper void as the gun mount overhaul requirements should be recommended contingent upon the results of the MCR. The fact that repair requirements were not specified in the case of the 5"/54 Mk 42s does not mean BOH repairs will not be performed. Repairs can be assigned as a result of the POT&I or MCR inspections. Additionally it was emphasized by the PERA (CRUDES) personnel that the BOH requirements can be varied if sufficient input and justification are provided the DDEOC Program planners.

For this analysis, the conversations with the GWSRP managers did not include detailed discussions of each DDEOC class BOH repair requirements written for the gun weapon systems. What was addressed was the fact that both the GWSRP and the TYCOMs have finite amounts of overhaul funds to support the refurbishment of the gun weapon systems for BOH/ROH repair requirements. Funding shortages could result in cuts to required BOH repairs which would create an incongruity in class material condition standards prior to the ships even starting their respective EOCs.

It is through a continuing process of input from the GWSRP that the DDEOC can be responsive to the latest needs of the gun weapon systems. Since the BOH is a one time availability for each ship of the class, it is essential that changes to baseline SARPs formulated for the BOH be made upon recognition of the requirement. This is important because the Baseline SARP will be used as an advanced planning document to assist in the job order preparation, advanced material procurement, design work, and early decision making by those activities responsible for supporting and conducting the overhaul prior to definition of the Authorized Ship Alteration and Repair Package (SARP) at the Work Definition Conference. The DDEOC Program can be provided with this information by the GWSRP in the following ways:

- TYCOM recommendations which have been investigated and found to be valid by proper GWSRP authority
- NAVSEACENS recommendations as a result of observed trends in the MCRs
- NOS Louisville recommendations as a result of the trends observed in the overhaul of gun weapon systems
- NOS Indian Head recommendations as a result of analysis conducted on the GWSRP management information system data

The further investigation of BOH requirement interface by the GWSRP participants is a mutual interest area that must be explored. Since the next overhaul availability prescribed by the DDEOC CMPs is approximately 60 months after the BOH, it is essential the gun weapon system receive the requisite depot level repairs during this period if they are to operate successfully during the extended overhaul cycle.

3.4.4 Identification of GWSRP Rotable Pool Requirements Needed in Support of DDEOC

The GWSRP is tasked to replace ordnance installed on active and reserve ships with properly configured/overhauled systems and components. Recent trends have pointed to the advantages of overhauling systems through rotatable pool repairs rather than entire system repairs. In most cases the rotatable pool system/component replacement is more cost effective, more easily managed, and requires less time to overhaul. OPNAVINST 3120.28, *Destroyer Engineered Operating Cycle (DDEOC); Implementation of*, states "... increased number of repairables components are being provided specifically for DDEOC ships to help reduce the time spent in maintenance availabilities". That statement along with the policy decision from the same instruction that states, "Stocking of spare will be provided as support for accomplishment of DDEOC predetermined maintenance requirements during the operating cycle", are indicative of the emphasis that OPNAV has placed on the rotatable pool maintenance concept in support of the DDEOC.

A policy of rotatable pool refurbishment becomes advantageous in certain maintenance actions. The overhaul and intermediate level maintenance of the gun weapon systems are inherently better served by this maintenance policy. The centralization of the needed technicians, industrial facility, and test and repair resources at a specified maintenance activity, such as the Naval Ordnance Station Louisville, results in greater efficiency and quality of repairs per overhaul dollar spent.

Present inventories of system "battle spares" maintained at NOS Louisville, which appear to be low, are the 5"/54 Mk 42 Mod 9 (one), the 5"/54 Mk 42 Mod 10 (two) and the Mk 68 GFCS (three). A NOS/L concern was whether the existing system spares could provide the requisite rotatable pool support within the framework of the DDEOC Program. This is an area of mutual program interest that is worthy of further investigation.

This investigation should address the nature of existing rotatable pool spares committed to support gun weapon systems. A repairables rework study was conducted and completed in FY 77 for the Ship Support Improvement Project (PMS 306). The intent of the study was to alleviate problems such as; the lack of adequate stock pools, underutilized or nonexistent rework capabilities, and a general failure to manage effectively the component repair cycles from carcass to ready for issue units. Combat systems repairables were included in the study. The results of that study should be reviewed against the current requirements of the GWSRP. Where the GWSRP can show trends of required maintenance as a result of MIS information, NAVSEACENS inspections, or Fleet maintenance actions; the need should be documented for DDEOC required rotatable spares. It should be submitted as a recommended equipment candidate forwarded by the DDEOC Program Office to the SSIP (PMS-306) for approval and consolidation within the Wholesale System Stock Requirements. By so doing, increased rotatable spares can be obtained and designed as mandatory replacement items for specified repair requirements. This could alleviate one of the existing problems experienced in supporting gun weapon systems. The

problem occurs when shipyards "repair" equipments rather than replace them with on the shelf Government Furnished Equipments and Government Furnished Material. The repair work is thought to be much more costly and less effective than would be replacement action with rotatable spares. Since no study has been conducted to prove or disprove this point, it might be included in future investigations of rotatable spare requirements.

3.4.5 GWSRP/DDEOC Program Data Interface

Research of both Programs' management plans indicated they were supported by Management Information Systems. These systems provide the software for data storage, manipulation, and retrieval in support of various management functions. The Management Information System supporting the GWSRP is maintained by WQEC Concord. Preliminary analysis of this system indicated the primary source of information was derived from the material condition reviews. The data from these inspections are reviewed by NOS Indian Head for content and formatting, then forwarded to WQEC Concord for compiling, file update, and information outputs. The system generates various types of reports, which could provide additional data to the DDEOC software. The primary management reports produced are:

1. Ordnance Replacement Index (ORI)
2. Fleet Report of Gun Systems (FROGS)
3. Inspection Status Report (Tickler File)
4. Equipment Condition Report (ECR)
5. Modified Equipment Condition Report

From these reports all or various portions of the data might provide valuable information on the gun weapon systems to the managers/planners. PERA (CRUDES) was interested in investigating the possibilities of receiving additional information on these systems' configurations. As ORDALTs are installed during overhaul or refurbishment, the configuration changes to the gun weapon system must be documented to allow for proper maintenance support planning. Configuration information is an example of the type of data interface that should be researched for future integration.

The DDEOC maintenance management system is called the Repair Maintenance Management System (RMMS). This system was developed for recording and scheduling periodic maintenance actions in accordance with the DDEOC Class Maintenance Plans. The RMMS identifies periodic restorative maintenance actions to be performed at the intermediate maintenance activity and depot levels of maintenance. The initial RMMS is being developed by PERA (CRUDES) and will be tasked in some of the following ways:

- Schedule and monitor maintenance from CMPs
- Provide tenders with ADP tapes usable for workload planning
- Provide schedules of periodic maintenance due in any timeframe selected

The RMMS will identify maintenance requirements for SRA and IMA planning. Various data sources will feed the system, i.e., DDEOC maintenance actions, alterations, recommendations based on Material Condition Assessments, technical repair standards, results of designated tests and inspections, CSMP, etc. This will all be compiled into a preliminary SARP to be used at the Work Definition Conference.

The input of configuration data, repair standards and requirements, and inspection results are three potential areas where the GWSRP could provide information to RMMS. The real time data that the GWSRP MIS maintains would be of significant benefit to the maintenance action planning provided by the RMMS. Further investigation into software compatibility, information requirements, data formatting and transfer, etc., would all have to be part of the technical research conducted to identify integration feasibility of a data exchange program between the two existing systems.

3.4.6 GWSRP Support and Input to DDEOC Site Teams

The DDEOC site teams have been established to provide the DDEOC Program with personnel to conduct or assist the Ship's Force in the performance of DDEOC assessment procedures. The DDEOC assessment procedures have been termed "Material Condition Assessment" (MCA). These assessment procedures encompass both performance assessment referring to the measurement of the output or production of a system or equipment and material condition assessment which refers to the actual material aspects of the item such as wear measurements, material thickness measurements, etc. Implementation of the Material Condition Assessment procedures by the DDEOC site teams are designed to provide:

1. Assessment of the required maintenance actions necessary to maintain a designated state of equipment and system readiness
2. Input for timely scheduling of maintenance actions, maintenance repair activity, and required repair materials
3. Assessment of the effectiveness of routine maintenance

The ship visits conducted by the site teams will provide the DDEOC Program with the data needed to effect a dynamic program of continued material condition improvement and system readiness.

The proposed composition of the DDEOC site teams is primarily HM&E oriented. In support of the gun weapon systems the site teams will include a Master Chief Fire Control Technician and two Electronics Technicians (Chief and First Class Petty Officer Radar Specialists). These individuals will be assigned the responsibility of performing or assisting Ship's Force in the performance of MCA procedures on the gun weapon system.

The GWSRP managers feel there are benefits to be gained from the additional data the MCAs could provide on selected areas of the gun weapon systems and equipments. The augmentation of the material condition reviews with data provided by the DDEOC site teams could provide for

potential improvements in system's condition and estimated service life. The immediate concern is the lack of a designated individual with dedicated experience on the operation and maintenance of the guns. Although a Master Chief Fire Control Technician coupled with experienced Ship's Force personnel could possibly meet this requirement, it would be advantageous to augment the expertise in the area of gun operation and maintenance.

The fact that the first DDEOC site teams are currently being manned on both the east and west coasts and MCA procedures are still being produced, indicates the time is right to address this particular mutual interest area.

The following are topics of potential interface:

1. GWSRP provides list of recommended MCA candidates to DDEOC Project Manager.
2. GWSRP provides the interface to augment the expertise of DDEOC site teams on gun weapon systems i.e., NAVSEACENS assistance.
3. GWSRP provides the expertise interface to develop MCA procedures, i.e., NAVSEACENS, NOS Louisville.
4. GWSRP becomes information recipient of results of MCA procedures conducted for gun weapon systems.

The integration support the GWSRP could provide the DDEOC site teams would be beneficial to both Programs. The GWSRP would receive additional informational reports of gun weapon system readiness and material condition status. The DDEOC Program could enhance the expertise of the DDEOC site teams without increasing personnel requirements while expanding the coverage of the MCA procedures.

3.4.7 Class Maintenance Plan Interface

The Class Maintenance Plan (CMP) is an integral portion of the DDEOC management plan. It defines anticipated maintenance requirements for systems and equipments of each class throughout an extended operating cycle. The CMP provides the framework for implementing an engineered maintenance program designed to maintain ship material condition at an acceptable level, with increased operational availability. DDEOC designed the CMP to be used to schedule EOC maintenance, estimate required manpower and skill levels, estimate required facilities, estimate required supply support, and develop repair packages for various availability periods.

The CMP is a structured plan, encompassing all ship systems and equipments whose need for maintenance can be reasonably projected. Those equipments that have historically been the greatest maintenance burden to a ship class will be given particular attention in CMPs. Because the gun weapon system qualifies for DDEOC CMP attention for the aforementioned reasons, it was discerned as a potential area of additional integration. The envisioned interface would result from the GWSRP program's ability to provide maintenance estimates to the various DDEOC Class CMPs. Inputs could be generated

as a result of trends indicated by the GWSRP Management Information System or by the Material Condition Reviews. In either case it would be important that information developed by the GWSRP be entered into the DDEOC CMPs. Of particular interest in this effort will be the identification of periodicity associated with each repair requirement. These will have to be matched to designated availabilities within the CMP. PERA (CRUDES) is interested in this aspect as they are responsible to NAVSEA-934X for planning the repair requirements for each designated DDEOC availability.

Investigation of the GWSRP identified the established procedures for defining the programs requirements. The planning of requirements is a coordinated effort between the TYCOMs, NAVSEASYSKOM (SEA-043 and 045), NAVORDSTA Louisville, NAVSEACENS, and NAVORDSTA Indian Head. Present provisions include the appropriate PERA as an information recipient of submitted requirements. The necessity to enhance this coordination is increased when the framework of an EOC is placed upon a class of ships. This EOC, as reflected by each CMP, designates maintenance actions be accomplished at given frequencies. The coordinating of this effort requires personnel from both PERA and the TYCOM DDEOC staff be made more aware of GWSRP procedures and requirements. Potential means of accomplishing such could be the attendance of a PERA (CRUDES) representative and the TYCOM DDEOC Coordinators at the GWSRP semi-annual Workload Scheduling Conference to ensure that the GWSRP requirements are phased with DDEOC CMP planning.

3.4.8 GWSRP/DDEOC Program Scheduling Interfaces

The DDEOC Program presently includes five classes of ships -- FF-1052 (46 ships), DDG-37 (10 ships), CG-16/26 (18 ships), and DDG-2 (23 ships). This totals to 97 ships that will be supported by four distinct EOC plans and schedules -- the CG-16 and CG-26 classes have been combined. On each ship in the DDEOC Program there are systems and equipments that are supported by the GWSRP. The maintenance strategy planning that the DDEOC Program will implement for these systems and equipments will impact the GWSRP.

The maintenance repair requirements and availabilities in which to accomplish them will require coordination between the various participants in both programs. This scheduling interface will address many areas of both programs from maintenance repair requirement periodicity to the commensurate funding needed to accomplish the repairs. An example of the magnitude of the scheduling interface that should be addressed is pointed out by the latest information of FF-1052 Class BOH schedules as stated in OPNAV Notice 4710. Presently, eight of the FF-1052s will start and complete their BOHs within one week of each other commencing CY-10/78 and ending CY-8/79. This should key several activities, such as the TYCOMs, NAVSEACENS, NOS Louisville, NAVSEA-0432, and others of their necessary action required to see that each ship leaves the BOH with its gun weapon systems overhauled and properly configured in accordance with the established DDEOC BOH requirements. This is but one specific example of the type of scheduling integration that should be studied.

PERA (CRUDES) expressed the need to coordinate schedules for those availabilities called out by each CMP with other specified maintenance repair requirements periodicities. In this effort such areas as configuration status, material requirements, workload planning, etc., should be addressed.

A key element to this scheduling interface is the ability of both programs to integrate their individual needs with the TYCOMs. The TYCOMs are pivotal in that they make the ships available and ultimately authorize the repair maintenance to be accomplished. This factor drives program functions such as NOS Louisville workload planning and the NAVSEACENS MCR inspection schedules. An area of this interface with the TYCOMs that needs further study is the planning between receipt of GWSRP funds and the identification TYCOM overhaul requirements. Often the Work Definition Conferences (WDC) are conducted in the blind in the sense that TYCOM has identified work required, yet the GWSRP has not yet identified funds available. This is a simplification of a complicated problem that requires further integration. The maintenance repair requirements called out by the DDEOC Program for specific availabilities gives both the GWSRP and TYCOMs the means to identify repair requirements and provides supportive inputs for POM justification on 97 combatants. Therefore it becomes more important that the GWSRP and DDEOC Programs interface their scheduling of support for these systems within the framework of the DDEOC.

One method of immediately enhancing the dialogue and interface between these programs would be to have the DDEOC TYCOM Coordinator and a representative from PERA (CRUDES) present at the Semi-Annual GWSRP Workload Scheduling Conference.

CHAPTER FOUR

CONCLUSIONS AND RECOMMENDATIONS

4.1 CONCLUSIONS

Conclusions drawn from the analyses conducted during the Gun Weapon System Replacement Program Coordination Effort Study were based on the interviews conducted with GWSRP and DDEOC Program activities and the data sources identified in this report. The study supports action in several areas to optimize the program coordination. This action will ultimately serve to enhance the operability, availability, and maintainability of the DDEOC Class ships gun weapon systems.

The following conclusions were reached as a result of the study:

- Inspections conducted prior to major overhaul of the Gun Weapon System Program systems and equipments are being conducted twice and are similar in their content and purpose.
- The complex nature of overhauling gun systems requires that increased specificity be written into the bid specifications. Substantial rework should be alleviated with the identification of more precise bid specifications to the potential overhaul activities.
- Baseline Overhaul (BOH) requirements are designed to include the maintenance and supply actions necessary to restore a DDEOC ship to a condition in which, with a well-engineered and executed maintenance and supply program, it can be expected to perform satisfactorily over an extended operating cycle. For gun weapon systems this requires a well-defined assessment from the GWSRP of the mandatory repairs required during BOH.
- Continued support of GWSRP systems and equipments is dependent largely upon rotatable pool repair of systems and components. To provide continued timely support of gun weapon system maintenance requirements within the framework of DDEOC, it is necessary to identify all rotatable pool requirements.
- Preliminary analysis of the management information systems supporting both programs revealed that incorporation of existing software should provide increased maintenance planning and scheduling data for the management of gun weapon systems within each program.

- Enhanced material condition and system readiness of gun weapons systems can be obtained through the application of material condition assessment (MCA) procedures conducted by DDEOC site teams. Support of the development and conduct of MCA procedures should be coordinated between the programs.
- The addition of GWSRP management and engineering information to DDEOC Class Maintenance Plans will enhance identification of the anticipated maintenance.
- Analysis of the GWSRP and DDEOC Program requirements reveal the desirability of coordinating and phasing the scheduling efforts of both programs.

4.2 RECOMMENDATIONS

On the basis of the study conclusions, the following recommendations are offered:

- Develop an inspection procedure for GWSRP system and equipments that eliminates the redundancy presently occurring.
- Develop comprehensive bid specifications for GWSRP systems/equipments that specify the repair requirements for system and equipment overhaul.
- Develop the procedures whereby GWSRP directly interfaces with the DDEOC Program in the development and review of BOH requirements.
- Develop a list of required rotatable pool material needed to support GWSRP systems and equipments within the framework of the DDEOC Program.
- Develop the procedures that specify the exchange of software and data between the GWSRP and DDEOC management information systems.
- Develop the procedures for interfacing GWSRP expertise into DDEOC site teams. This interface should also include potential gun weapon system candidates for MCA.
- Establish procedures whereby continuous GWSRP input can be provided to the engineering efforts used in development and revision of DDEOC Class Maintenance Plans and BOH requirements.
- Develop the procedures and actions required to coordinate the scheduling interfaces between the GWSRP and DDEOC Programs for support of GWSRP systems.

The eight areas of mutual interest can be examined with respect to the DDEOC Program. Figure 4-1 projects a schedule of effort that would allow each area to be accomplished in phase with key events occurring in the engineered operating cycle of DDEOC Class Ships. The projected schedule also considers the economies of concurrent and sequential efforts in some related areas. The schedule is presented with a 15 month duration and nominal completion in September 1979. As mutual interest areas are integrated or new areas arise, the schedule should be modified accordingly.

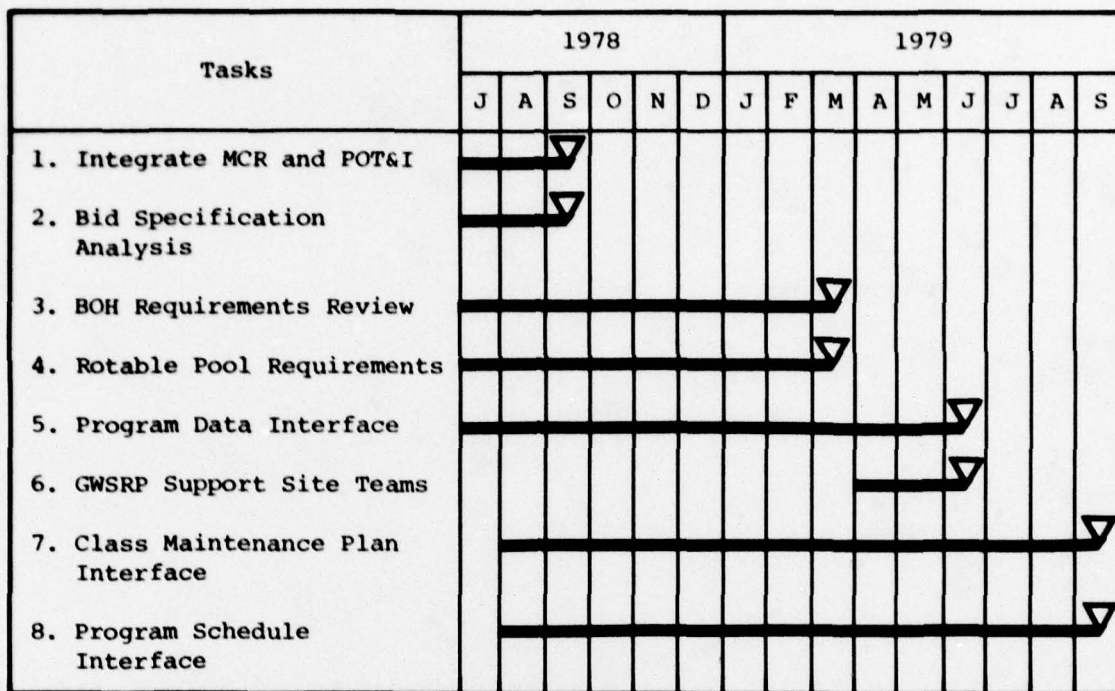


Figure 4-1. PROJECTED INTEGRATION SCHEDULE